

Claims:

1. A method of forming a multilayer metal foil product comprising  
providing a continuous stack of metal foil layers;  
separating at least two of the layers of the stack;  
imparting a pattern or surface treatment to at least one of said  
separated layers of metal foil;  
recombining the separated metal foil layers into a continuous stack  
of metal foil layers; and  
forming and cutting individual multilayer metal foil parts from said  
recombined continuous stack of metal foil layers.
2. A method according to claim 1 wherein the pattern imparted to said  
at least one layer of metal foil is embossments or corrugations.
3. A method according to claim 1 wherein the continuous stack of  
metal foil layers is provided from a z-fold pack.
4. A method according to claim 1 wherein the stack of metal foil  
layers comprises a fibrous layer between two metal foil layers.
5. A method according to claim 1 wherein the surface treatment  
comprises an adhesive applied to a surface of said at least one layer of metal foil.
6. A method according to claim 1 wherein the stack of metal foils  
comprises a metal sheet layer.

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7. A method according to claim 2 comprising providing a stack of metal foil layers having at least one layer having a preexisting embossed pattern and imparting to at least one separated layer of metal foil a pattern of corrugations before recombining the layers into the continuous stack.

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8. A method according to claim 2 comprising providing a stack of metal foil layers having all the layers embossed and nested and imparting to at least one separated layer a pattern of corrugations before recombining the layers into the continuous stack.

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9. A method according to claim 3 comprising providing a stack  
10 comprising five metal foil layers comprising three embossed metal foil layers and two smooth metal foil layers positioned one between each pair of embossed metal foil layers and imparting a pattern of corrugations to each of the two smooth metal foil layers before recombining the five metal foil layers into the continuous stack.

10. An apparatus for producing a multilayer metal foil product  
15 comprising  
a separator for receiving a continuous stack of metal foil layers and separating at least two layers of said stack;  
a tool for imparting a pattern or surface treatment to at least one of said layers of metal foil;  
20 a feeder for feeding the separated layers through a slot for recombining the layers into a continuous stack of metal foil layers; and  
a second tool for receiving the recombined stack and for forming and cutting individual multilayer metal foil parts from said stack.

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11. An apparatus according to claim 10 wherein the pattern imparted to said at least one layer of metal foil is embossments or corrugations.

12. An apparatus according to claim 10 comprising a first feeder for receiving the continuous stack of metal foil layers from a z-fold pack and feeding  
5 the continuous stack to said separator.

13. An apparatus according to claim 10 wherein the surface treatment comprises an adhesive applied to a surface of said at least one layer of metal foil.

14. An apparatus according to claim 10 comprising an intermediate feeder for feeding an additional layer of material between two of the separated  
10 layers and through said slot to combine the additional layer of material with the recombined continuous stack of metal foil layers.

15. An apparatus according to claim 14 wherein the additional layer is a fiber layer.

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16. A method of forming a multilayer metal foil product comprising  
providing a continuous stack comprising patterned and nested metal foil layers;  
separating at least two of the nested layers of the stack;  
recombining the separated metal foil layers into a continuous stack  
20 of the metal foil layers in a manner to prevent the layers from nesting; and  
forming and cutting individual multilayer metal foil parts from said recombined stack of metal foil layers.

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17. A method according to claim 16 comprising imparting an additional pattern or a surface treatment to at least one of said separated layers of metal foil.

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18. A method according to claim 16 wherein the pattern imparted to said at least one layer of metal foil is embossments or corrugations.

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19. A method according to claim 16 wherein the continuous stack of metal foil layers is provided from a z-fold pack.

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20. A method according to claim 16 wherein the stack of metal foil layers comprises a fibrous layer between two metal foil layers.

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21. A method according to claim 16 wherein the surface treatment comprises an adhesive applied to a surface of said at least one layer of metal foil.

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22. A method according to claim 16 wherein the stack of metal foils comprises a metal sheet layer

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23. An apparatus for producing a multilayer metal foil product comprising  
a separator for receiving a continuous nested stack of patterned metal foil layers and separating at least two layers of said stack;  
20 a tool for offsetting the separated layers to prevent nesting of the layers when recombined into a stack;  
a feeder for feeding the separated layers through a slot for recombining the layers into a stack of continuous metal foil layers; and  
a second tool for receiving the recombined stack and for forming  
25 and cutting individual multilayer metal foil parts from said stack.

24. An apparatus according to claim 23 comprising an additional tool for imparting an additional pattern or a surface treatment to at least one of said layers of metal foil.

25. An apparatus according to claim 23 wherein the pattern imparted to said at least one layer of metal foil is embossments or corrugations.

26. An apparatus according to claim 23 comprising a first feeder for receiving the continuous nested stack of metal foil layers from a z-fold pack and feeding the continuous stack to said separator.

27. An apparatus according to claim 24 wherein the surface treatment comprises an adhesive applied to a surface of said at least one layer of metal foil.

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28. A method of producing a multilayer metal foil product comprising:  
combining a plurality of continuous metal foil layers to form an  
advancing continuous stack of metal foil layers;  
scoring or creasing the advancing stack of continuous metal foil  
layers across at least a portion of the width of the stack at predetermined intervals;  
causing the continuous stack of metal foil layers to fold in  
alternating directions at said scores or creases; and  
piling the alternately folding stack in a zigzag fashion to form a  
z-fold pack of the continuous stack of metal foil layers.

29. A method according to claim 28 wherein the step of combining the continuous metal foil layers comprises combining a plurality of continuous flat metal foil layers to form a stack and imparting a pattern to all layers of the stack to form a stack of patterned and nested metal foil layers.

5 30. A method according to claim 28 wherein the step of combining the continuous metal foil layers comprises combining a plurality of previously patterned metal foil layers to form a continuous stack of spaced apart metal foil layers.

10 31. A method according to claim 28 wherein the step of combining the continuous metal foil layers comprises combining at least one patterned metal foil layer and at least one flat metal foil layer to form a continuous stack of metal foil layers.

32. A method according to claim 28 wherein the metal foil layers combined to form the stack are flat metal foil layers.

15 33. A method according to claim 29 wherein the pattern imparted to the stack of metal foil layers is embossments or corrugations.

Sub 33 34. A method according to claim 28 wherein the pattern imparted to the stack of metal foil layers is embossments or corrugations.

20 35. A method according to claim 29 wherein the pattern imparted to the stack of metal foil layers is embossments or corrugations.

36. A method according to claim 28 comprising combining a fiber layer between two of the metal foil layers.

37. An apparatus for producing a multilayer metal foil product comprising:

5 a plurality of feeders for feeding a plurality of continuous metal foil layers to a collection slot;

a collection slot positioned to receive the plurality of continuous metal foil layers therethrough to form a continuous stack of said layers and positioned to pass the continuous stack to a tool;

10 a tool for laterally scoring or creasing the continuous stack of said layers across at least a portion of its width at predetermined intervals and causing the continuous stack of said layers to fold in alternating directions at said intervals into a pile; and

15 a support member positioned for receiving the pile of the folding stack of said layers from said tool to form a z-fold pack of folded continuous stack of metal foil layers.

38. An apparatus according to claim 37 wherein the collection slot is formed by two spaced-apart rollers.

20 39. An apparatus according to claim 37 wherein the collection slot is formed by two spaced-apart bars.

40. An apparatus according to claim 37 wherein the tool is adapted to score or crease the stack at variable intervals to produce different size z-fold packs or to produce different size folds within a single z-fold pack.

41. An apparatus according to claim 37 comprising a pattern tool positioned for importing a pattern to at least one layer of the continuous metal foil layers and convey said at least one layer to one of said plurality of feeders.

5 42. A multilayer metal foil product comprising a plurality of continuous metal foil layers having a width X and formed in a multilayer stack wherein the continuous multilayer stack of metal foil layers is folded across width X at intervals Y in alternating directions, is piled in a zigzag fashion in the form of a pack of a continuous multilayer metal foil stack, said pack having a width X, a length Y and a height H determined by a preselected desired length of the z-folded  
10 continuous multilayer stack of metal foil layers.

43. A multilayer metal foil product according to claim 42 wherein at least one of said metal foil layers is patterned.

44. A multilayer metal foil product according to claim 42 wherein at least one of said metal foil layers is embossed or corrugated.

15 45. A multilayer metal foil product according to claim 42 comprising at least one fiber layer.

46. A method of producing multilayer metal foil parts comprising:  
feeding to a parts forming operation a continuous multilayer stack of metal foil layers from a z-fold pack of a continuous multilayer stack of metal  
20 foil layers; and  
forming and cutting individual multilayer metal foil parts from said stack of metal foil layers.

47. A method according to claim 46 wherein at least one of said metal foil layers is patterned.

48. A method according to claim 46 wherein at least one of said metal  
5 foil layers is embossed or corrugated.

49. A method according to claim 46 comprising at least one fiber layer.

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